Analysis of State of New Mexico Gold King Mine Long-term Monitoring Plan

Objective: Determine EPA support for tasks identified in the NM long-term monitoring plan (draft Oct 20, 2015). Determinations based upon ability of tasks to identify current groundwater, surface water and sediment conditions along the Animas and San Juan Rivers.

	Activity Supported
	Activity Not Supported

1. Public Drinking Water Systems –

Activity	Rationale for Support
A. Work with public water systems to develop a regional Source Water Protection Plan that will address potential contamination issues from the GKM spill.	Consistent with source water protection activities.
B. Monitor sources of public water supply **in accordance with schedules and analyses required by the Safe Drinking Water Act.**	Required activity under Safe Drinking Water Act.
C. Establish real time monitoring of the Animas River for indicator parameters, such as flow rate and turbidity, and provide alerts to public water systems of high-flow or flood events so that they may take appropriate actions.	Real-time data is a practical and useful activity supported by states, EPA and USGS.
D. Explore interest among public water systems in Colorado, and with the State of Colorado, in collaborating on the regional Source Water Protection Plan (described above).	Consistent with source water protection activities.
E. Work with public water systems to develop a regional Source Water Protection Plan that will address potential	Consistent with source water protection activities.

contamination issues from the GKM spill.	
F. Increase sampling frequency, if appropriate, in response to detection of increased heavy metal concentrations in source waters.	This activity is current standard practice.

2. Surface Water Quality

Activity	Rationale for Support
A. Surface water quality sampling:	Consistent with current ambient monitoring activities.
B. Field parameters, total dissolved and suspended solids, anions/cations, dissolved and total metals; also collect suspended solids on filter paper and test for total metals	Consistent with current ambient monitoring activities.
C. Seasonal base flow	Consistent with current ambient monitoring activities.
D. Storm events and snowmelt	Consistent with current ambient monitoring activities.
E. Field parameters, total dissolved and suspended solids, anions/cations, dissolved and total metals; also collect suspended solids on filter paper and test for total metals	Consistent with current ambient monitoring activities.
F. Seasonal base flow	Consistent with current ambient monitoring activities.
G. Storm events and snowmelt	Consistent with current ambient monitoring activities.

3. Sediment

Activity	Rationale for Support
A. Initial and periodic future sampling, especially after runoff/storm events, of surface water sediment and irrigated soils for heavy metals and evidence of increasing concentrations migrating into NM from CO.	Sediment characterization is consistent with ambient monitoring activities.

4. Solids Characterization

Activity	Rationale for Support
A. Review solid characterization data for GKM site and surrounding mines and mine waters to establish likely initial forms of solid contaminants.	In general, these tasks are already supported through GKM CERCLA activities
B. Directly characterize solids and associated metals from water and sediment along the flow path.	
C. Model the likely transformation and release of mixed metals in GKM spill solids in different depositional environments.	

5. Aquifer-River Interactions

Activity	Rationale for Support
A. Sample surface water, near-river wells, stream sediment, rock coatings, and hyporheic zone sediment and pore fluid at twenty sites from Cement Creek, CO, through N.M., and into Bluff, UT for general chemistry and trace metals.	• Quantification of groundwater interaction may be appropriate for identifying concerns in source water.

6. Regional Ground and Surface Water Hydraulics

Activity	Rationale for Support
A. Measure water levels in surface water (both rivers and irrigation ditches) and in up to 80 wells seasonally for two years.	• Quantification of groundwater interaction may be appropriate for identifying concerns in source water.
B. Prepare potentiometric (water level) maps for each measurement event with an interpretive report on groundwater flow direction/velocity, and on interactions between ground and surface water.	• Quantification of groundwater interaction may be appropriate for identifying concerns in source water. • Supports aquifer characterization efforts.

7. Ground Water Quality

Activity	Rationale for Support
A. Map and evaluate water quality data collected by the EPA in August 2015 from private domestic wells that were self-identified by residents and sampled for laboratory analysis.	Groundwater quality appropriate under Source Water Protection activities.

8. Ongoing and Potential Future Discharges in the Mining Area

Activity	Rationale for Support
B. Identify locations, volumes and chemical quality of water impounded in mine workings in the upper Animas watershed.	In general, these tasks are already supported through GKM CERCLA activities
C. Identify and chemically characterize ongoing mine water seeps and gauge flow rates.	
D. Identify locations of waste rock and mill tailings piles that have the potential to discharge into surface water.	

10. Plants / Animals – Habitat

Activity	Rationale for Support
E. Benthic microbes and macro-invertebrates	Macroinvertebrate quantification consistent with ambient monitoring activities.
F. Riparian invertebrates	Riparian invertebrate quantification consistent with ambient monitoring activities.
G. Fish	Fish quantification consistent with ambient monitoring activities.

NOT INCLUDED / NOT SUPPORTED:

1. **Public Drinking Water Systems**

G. Monitor sedimentation basin sludge for evidence of heavy metal buildup.	Standard practice for sludge removal and disposal (i.e. RCRA)

2. Surface Water Quality

• With staff already in the field, this would be a good time to collect other parameters of concern that are known to be out of compliance with state water quality standards – E.coli, nitrogen, phosphorus. Current data suggests that these are also associated with storm events.	Additional parameters, though not costly, are not consistent with parameters associated with mine run-off.

3. Sediment

• Facilitate coordination between ditch associations and public water systems to ensure that future ditch flushing does not adversely impact drinking water intakes.	This activity should already be captured under county and drinking water system emergency plans.

7. Ground Water Quality

• Identify additional private water supply wells that may be influenced by recharge from irrigation ditches and sample for general chemistry and trace metals.	Covered under *supported* activity 5A, above.
• If possible, identify indicator parameters that can be used to monitor groundwater for possible impacts from the spill. Select wells for additional sampling of indicator parameters based upon hydraulic relationships to rivers and irrigation ditches.	Covered under *supported* activity 5A, above.
• Identify private domestic wells that are at risk of being inundated by floodwater that may contain mine waste; sample for heavy metals and bacteria.	Covered under *supported* activity 5A, above.

9. Airborne Dust

• Monitor airborne dust in the watershed	Need for this task undetermined.

10. Plants / Animals – Habitat

• Amphibians and reptiles	Parameter inconsistent with ambient monitoring program
• Terrestrial wildlife	Parameter inconsistent with ambient monitoring program
• Birds	Parameter inconsistent with ambient monitoring program
• Livestock	Parameter inconsistent with ambient monitoring program
• Crops	Parameter inconsistent with ambient monitoring program

11. Bio-monitoring

Farmington-area residents will be recruited to assess levels of heavy metals in their private well water and urine, as described in the existing Internal Review Board-approved methodology.	This activity is part of a larger ongoing public health bio-monitoring activity by the state.